

Remarks/Arguments

Claims 1-5, 7-9, 11-14, 16-23, 25-28 and 30-36 are pending in the present application. Claim 9 has been amended to incorporate the subject matter of claim 10, and claim 10 has been canceled to expedite prosecution. Claim 11 has been amended to depend from claim 9. No claims have been added. Applicant has carefully considered the cited art and the Examiner's comments, but believes the claims patentably distinguish over the cited art and are allowable in their present form. Reconsideration of the rejection is, accordingly, respectfully requested in view of the above amendments and the following comments.

I. 35 U.S.C. § 103, Obviousness

The Examiner has rejected claims 1-3, 7-8, 13-14, 17-19, 21, 26-28, 31-33 and 35 under 35 U.S.C. § 103(a) as being unpatentable over Knox et al. (U.S. Patent No. 5,526,155). This rejection is respectfully traversed.

In rejecting the claims, the Examiner states:

Knox disclosed a broadband frequency spectrum source (11 of Figure 2) that is split into a plurality of different carrier wavelengths (20, 22 of Figure 2) after splitting by a diffraction grating (18) the plurality of signals are then modulated by an array of modulators (26 of Figure 2) responsive to data signals (29 of Figure 2) which are then recombined by the diffraction grating (18) which are then output to a desired transmission medium (34 of Figure 2), see col. 7, lines 1-50. Knox does not disclose the literal "passing a plurality of desire portions of the optical signal using a plurality of modulators...". However, Knox disclosed that a portion of the signal from source (11) out of the pick-off mirror (14) is incident on grating (18), see col. 6, lines 54-60. It would have been obvious to one of ordinary skill in the art at the time of invention that not only a portion of the source signal (11) is modulated as evidenced by the preceding passage, but also each modulator (27) in the array (26) receives a portion of the wavelength split beam. Furthermore, every wavelength emitted from the light source is predefined by definition of the inventor having knowledge of the desired light source.

Office Action dated May 31, 2005, pages 2-3.

Claim 1 is as follows:

1. A method of optical communication comprising:
 - providing a plurality of optical signals;
 - providing a plurality of data signals;
 - providing a plurality of optical modulators, each of the plurality of optical modulators:
 - receiving one of the plurality of optical signals and one of the plurality of data signals;
 - passing a desired portion of the received optical signal, the passed desired portion of the received optical signal having at least one predefined wavelength;
 - optically modulating the passed desired portion of the received optical signal responsive to the received data signal to provide an optically modulated passed desired portion of the received optical signal; and
 - outputting the optically modulated passed desired portion of the received optical signal to an optical communication medium.

Knox does not disclose or suggest “passing a desired portion of the received optical signal, the passed desired portion of the received optical signal having at least one predefined wavelength” as recited in claim 1.

Knox discloses an optical wavelength division multiplexing device. As acknowledged by the Examiner, the device includes a diffraction grating 18 that divides light from a light source 11 into a plurality of optical signals. The plurality of optical signals is then directed to an array of modulators 26 where they are modulated responsive to a plurality of data signals. The modulated optical signals are then recombined by the diffraction grating 18.

In Knox, the diffraction grating divides the light into a plurality of optical signals and the plurality of optical signals is directed to a plurality of modulators to be modulated. Nowhere does Knox disclose or suggest that a desired portion of the optical signals received by the modulators of the plurality of modulators are passed by the optical modulators, and that the passed desired portion of the optical signals are optically modulated. In Knox, it is the optical signals as received by the modulator array that are modulated. Even though, as contended by the Examiner, the diffraction grating in Knox may cause light of different wavelengths to impinge on the modulator array, this is not a disclosure of the modulators in the modulator array “passing a desired portion of the received optical signal, the passed desired portion of the received optical signal having at least one predefined wavelength” as recited in claim

1. In Knox, the modulators in the modulator array pass the entire received optical signals, not a desired portion of the received optical signals.

In responding to Applicant's comments in the Response to Office Action filed December 27, 2004, the Examiner states:

Applicant's arguments with respect to Knox however are not persuasive. Applicant alleges that Knox does not teach "passing a desired portion of the received optical signal...". The Examiner looks to the applicant's specification of "passing a desired portion of the received optical signal". It appears that the specification is silent beyond reciting the exact words which have been cited in the claim. Furthermore, it appears that a portion of the desired signal can only refer to the fact that a divided signal is therefore a desired portion. Obviously a wavelength splitter that causes different wavelengths to impinge on the modulator array in Knox is in fact passing a desired portion of the signal. This is extremely clear from a comparison of the applicant's disclosure and the prior art. Thus the applicant arguments are not persuasive.

Office Action dated May 31, 2005, page 2.

Applicant respectfully disagrees. Initially, it is incorrect that the specification is silent beyond reciting the exact words "passing a desired portion of the received optical signal" contained in claim 1. The specification, in fact, includes substantial disclosure regarding this aspect of the invention. For example, in lines 12-15 of paragraph [0026] on page 7 it is stated:

Alternatively, filtering of light from individual optical signals 23 is implemented by the optical modulators to remove undesired light from optical signals 23.

Further, in paragraph 27 on pages 7 and 8 it is stated:

In an alternative implementation of optical communication system 10, divider 22 provides no wavelength division but rather divides optical signal 21 into optical signals 23 which individually have substantially the same wavelength spectrum as signal 21. Accordingly, optical signals 23 comprise broad spectrum signals in such an embodiment. Optical modulators of array 24 filter and modulate the broad spectrum signals 23 providing optical signals 25 as described above. In such an arrangement, the optical modulators are configured to filter undesired portions of optical signals 23 outside of the respective passbands of the optical modulators and to pass and to modulate the respective desired portions of optical signals 23. (Emphasis added.)

Yet further, paragraphs [0037] – [0043] on pages 10-12 describe in substantial detail exemplary embodiments in accordance with the invention by which desired portions of received optical signals are passed by the plurality of optical modulators.

Thus, it is clear that the specification is not silent beyond reciting the exact words “passing a desired portion of the received optical signal...”, but fully and completely discloses this aspect of the present invention.

Applicant also respectfully disagrees with the Examiner’s assertion that “Obviously a wavelength splitter that causes different wavelengths to impinge on the modulator array in Knox is in fact passing a desired portion of the signal.” As discussed above, each modulator in the modulator array in Knox appears to modulate and pass the entire optical signal it receives, not a desired portion of the received optical signal. At best, the splitter in Knox might correspond to the divider 22 in the exemplary embodiment in accordance with the invention illustrated in Figure 1, but it does not correspond to the modulator array in Knox passing desired portions of received optical signals.

Furthermore, it would not be obvious to one skilled in the art to modify Knox in order to achieve the present invention. Only the present application discloses “passing a desired portion of the received optical signal, the passed desired portion of the received optical signal having at least one predefined wavelength”, and any modification of Knox to achieve the present invention would be based on hindsight using Applicant’s own disclosure and not on the cited art.

For at least all the above reasons, claim 1 is neither taught by nor obvious in view of Knox, and is believed to be patentable over Knox in its present form.

Claims 2, 3, 7, 8 and 33 depend from and further restrict claim 1, and should also be allowable in their present form, at least by virtue of their dependency. In addition, claim 2 requires that the optical modulation comprises frequency modulation. Knox does not disclose frequency modulation as was acknowledged by the Examiner in paragraph 5 on page 3 of the Office Action; and claim 2 should be allowable in its own right as well as by virtue of its dependency.

Independent claim 13 is as follows:

13. An optical communications method comprising:
dividing a source-light beam into plural carrier-light beams;
modulating said carrier-light beams responsive to respective data
signals to yield plural encoded-light beams, wherein said encoded light beams
have different respective encoded-light wavelengths; and
combining said encoded-light beams to yield a multiplexed-light beam,
wherein said combining step comprises frequency-multiplexing said encoded
light beams.

Knox nowhere discloses or suggests “combining said encoded-light beams to yield a multiplexed-light beam, wherein said combining step comprises frequency-multiplexing said encoded light beams” as recited in claim 13.

In Col. 7, lines 51-62, Knox discloses that the diffraction grating 18 functions both as a wavelength splitter and a wavelength combiner, or that a separate wavelength combiner may be used to recombine the modulated optical signals. Knox does not appear to disclose that the encoded light beams are encoded by “frequency-multiplexing said encoded light beams”, nor has the Examiner identified any such disclosure in Knox or commented in any way as to why it would be obvious to modify Knox to achieve the invention recited in claim 13.

Claim 13, accordingly, is also believed to be allowable over Knox in its present form, together with claims 14, 17 and 18 dependent thereon.

Independent claim 19 is also believed to be allowable in its present form for substantially the same reasons as discussed above with respect to claim 1, and independent claim 27 should be allowable for substantially the same reasons as discussed above with respect to claim 13. Claims 21, 26 and 35 should be allowable at least by virtue of their dependency from claim 19, and claims 28, 31 and 32 should be allowable at least by virtue of their dependency from claim 27.

Therefore, the rejection of claims 1-3, 7-8, 13-14, 17-19, 21, 26-28, 31-33 and 35 under 35 U.S.C. § 103(a) has been overcome.

II. 35 U.S.C. § 103, Obviousness

The Examiner has rejected claims 4, 5, 9, 20, 22 and 23 under 35 U.S.C. § 103(a) as being unpatentable over Knox et al. (U.S. Patent No. 5,526,155) in view of Roberts et al. (U.S. Patent No. 6,313,932 B1). This rejection is respectfully traversed.

Claims 4 and 5 depend from and further restrict claim 1, and claims 20, 22 and 23 depend from and further restrict claim 19. Roberts does not supply the deficiencies in Knox as discussed above, and these claims should be allowable in their present form, at least by virtue of their dependency.

In addition, several of the claims recite additional subject matter that is neither disclosed nor suggested by either Knox or Roberts. For example, neither Knox nor Roberts discloses or suggests “wherein the passing and the optically modulating comprise passing and optically modulating the desired portion of the optical signal within the pass band of the optical modulator and not passing and not optically modulating other portions of the optical signal outside of the pass band” as recited in claim 4, nor “wherein the optical modulators are configured to frequency modulate the desired portions of the coupled optical signal” as recited in claim 20.

With respect to claim 20, in particular, the Examiner contends that Roberts discloses frequency modulation as a filter for either passing, filtering portions of the optical signal having respective different wavelengths. Applicant respectfully disagrees.

Roberts states in col. 10, lines 23-26 that actuation of modulating elements allows “a distinct spectral modulation to be introduced into the optical signal” within the transmitted pulse. Spectral modulation is described in detail in Col. 10, lines 32-63 of Roberts. Roberts discloses use of a Mach Zehnder interferometer to perform spectral modulation, and states in col. 10, lines 62-63 that the spectral modulation may be termed “Fourier modulation in the present context”. Roberts accordingly, does not appear to disclose or suggest optical modulators configured to frequency modulate a desired portion of an optical signal as recited in claim 20.

Independent claim 9 has been amended to incorporate the subject matter of claim 10, and claim 10 has been canceled. The rejection of claim 9 as being unpatentable over Knox in view of Roberts is, accordingly, now moot.

Therefore, the rejection of claims 4, 5, 9, 20, 22 and 23 under 35 U.S.C. § 103 has been overcome.

III. 35 U.S.C. § 103, Obviousness

The Examiner has rejected claims 10-12 under 35 U.S.C. § 103(a) as being unpatentable over Knox et al. (U.S. Patent No. 5,526,155) in view of Roberts et al.

and further in view of Wilner et al. (U.S. Patent No. 6,341,021). This rejection is respectfully traversed.

As indicated above, claim 9 has been amended to incorporate the subject matter of claim 10, and claim 10 has been canceled. Neither Knox, Roberts nor Wilner discloses or suggests “wherein the optical modulator comprises a filter having a pass band, and wherein the encoding comprises frequency modulating at least the portion of the optical signal within the pass band” as now recited in claim 9.

Wilner discloses, as shown, for example, in Fig. 1A, that after optical signals are modulated by modulators AO1....AOn, the modulated signals are combined by coupler 18. The combined signal is then fed back to the modulators using a feedback loop 22, and filters OF1....OFn in the feedback loop reconverts the combined signal back to separate signals to be directed to the modulators.

Thus, in Wilner, it is the combined, modulated signal outputs of the modulators that are filtered. There is no disclosure of an optical modulator comprising “a filter having a pass band” as recited in claim 9, or that the optical modulators perform filtering as recited in claims 11-12.

Furthermore, as discussed previously, Roberts also does not disclose frequency modulation as now recited in claim 9. Claim 9, together with claims 11 and 12 dependent thereon are, accordingly, not obvious over Knox, Roberts and Wilner, and should be allowable in their present form.

Therefore, the rejection of claims 10-12 under 35 U.S.C. § 103 has been overcome.

IV. 35 U.S.C. § 103, Obviousness

The Examiner has rejected claims 16, 25, 30, 34 and 36 under 35 U.S.C. § 103(a) as being unpatentable over Knox et al. (U.S. Patent No. 5,526,155) in view of Young et al. (U.S. Patent No. 5,760,941). This rejection is respectfully traversed.

Claims 16, 25, 30, 34 and 36 depend from and further restrict one of independent claims 1, 13, 19 and 27. Young does not supply the deficiencies in the principal references as discussed above. Accordingly, these claims should be allowable in their present form at least by virtue of their dependency.

Therefore, the rejection of claims 16, 25, 30, 34 and 36 under 35 U.S.C. § 103 has been overcome.

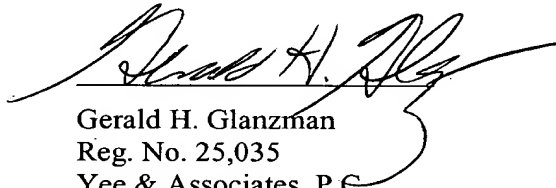
V. CONCLUSION

For at least all the above reasons, claims 1-5, 7-9, 11-14, 16-23, 25-28 and 30-36 /are believed to be allowable in their present form, and this application is believed to be in condition for allowance. It is, accordingly, respectfully requested that the Examiner so find and issue a Notice of Allowance in due course.

The Examiner is invited to call the undersigned at the below-listed telephone number if in the opinion of the Examiner such a telephone conference would expedite or aid the prosecution and examination of this application.

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Respectfully submitted,



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